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COPLEY PLACE

COMPREHENSIVE DESIGN SUBMISSION

APRIL 1981

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COPLEY PLACE

COMPREHENSIVE DESIGN SUBMISSION

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URBAN
INVESTMENT AND
DEVELOPMENT CO.

April 30, 1981

Mr. Robert J. Ryan
Director
Boston Redevelopment Authority
One City Hall Plaza
Boston, Massachusetts 02201

Re: Comprehensive Design Submission

Dear Bob:

UIDC submits to you for your approval our comprehensive response to the nine "open design items" enumerated in the Design Review Agreement between UIDC and the BRA dated September 22, 1980.

Our submission is the product of months of study by UIDC and its architects of alternative design possibilities responsive to the ongoing dialogue with your staff and your Design Advisory Group. Our architects are firms with world famous reputation to whom we have given design freedom. The result of their work is a project that we believe is outstanding architecture, uniquely suited to the City of Boston and its Copley Square location as well as to the difficulties of the site.

Copley Place is designed to harmonize with the scale of the important landmarks - the Public Library, the Copley Plaza, and Trinity Church - which frame Copley Square. Its exterior facades both respect and echo those of adjacent buildings in Copley Square through the selection of materials and the theme of horizontal banding repeated throughout the project. The project completes the enclosure of the Square and reunites Copley Square with the South End by extending the edge of the Square across the division caused by the Turnpike.

UIDC has done its utmost to be responsive to all of the BRA staff's ideas for solutions to the nine "open design items." However, in reaching the decisions reflected by this design submission, UIDC has been mindful of the necessary balance between design objectives and economic realities. We have been

candid with you in the past that the economics of Copley Place are delicately balanced. Our long months of aggressive negotiations over the terms of the UDAG Grant and Loan for Copley Place vividly underscore the sensitivity of the project to cost differentials measured in thousands of dollars. As you will see, the design solutions presented by UIDC significantly impact that delicate balance by adding costs to the project of approximately $2.6 million (See Breakdown of Additional Project Costs). Although we are prepared to undertake the solutions represented in this submission, greater increases in the cost of the project would tip the balance between design objectives and economic realities.

It should be noted that with the sole exception of the satellite retail space all of the expenditure for design changes will not produce any incremental revenue. Even in the case of the satellite retail space the capitalized value of the projected revenue achievable in such space is only 50% of the cost of creating such space.

We have made a very serious design effort which we believe fully satisfies the spirit of the nine "open design items" in our agreement. Yet even among architects with the finest credentials there will always be differences of opinion on the subject of aesthetics. We believe that as a result of this submission only that kind of abstract difference could remain between us on any of the open design items.

We look forward to your early approval of this design submission so that we can get on with the exciting challenge of building Copley Place, a project of which both UIDC and the City of Boston will be justly proud.

Sincerely,

Urban Investment and Development Co.

Ken Himmel

Kenneth A. Himmel
Senior Vice President and
Project Manager

OPEN DESIGN ITEM LIST

1. The design of active pedestrian uses, sidewalks, and building form on both sides of the Stuart Street Corridor.

2. The Architectural treatment of Copley Place Elevations along the Southwest Corridor deck.

3. The architectural treatment of the Marriott Hotel tower elevations.

4. The design and form of the housing element of the project. [illegible] St.

5. The specific treatment of the proposed Western International Hotel Cafe.

6. The treatment of the Neiman Marcus exterior elevations along Dartmouth Street Yes

7. The design of the glass shed structure connecting Back Bay Station Tunnel and South mall entrance.

8. Satisfactory resolution of issues concerning the landscape design of the Turnpike deck cover, and architectural treatment of the adjacent Stuart Street facade. N

9. Satisfactory resolution of the establishment of measures to mitigate pedestrian level winds including any wind tunnel testing necessary to investigate any such measures. Yes [illegible] [illegible]/only

NARRATIVE OF RESPONSES TO THE NINE OPEN DESIGN ITEMS

I. The design of active pedestrian uses, sidewalks, and building form on both sides of the Stuart Street corridor.

[Presentation Material: Stuart Elevation (Hotel Boston), Stuart Street Elevation (Central Area) and Perspective]

This has perhaps been the most publicized "open design item," one which has had the most attention from all levels of state and municipal government as well as the public and the one on which we have made, at once, the most and least progress. The item actually encompasses three concepts and each of those three concepts will be separately discussed.

The first such concept is the sidewalk on the south side of Stuart Street. We have learned after much debate that the sidewalk itself was never the issue. The issue has been the nature of the pedestrian crossing, if any, across the mouth of exit ramp D from the Massachusetts Turnpike. UIDC and the BRA have agreed that the solution to the crossing question should be jointly developed by their respective staffs. Therefore, this submission does not attempt to resolve the sidewalk-crossing issue. The proposal, insofar as it addresses the design of the project on the south side of Stuart Street, will accommodate a 10 foot sidewalk. (See Illustrated Site Plan)

The second and third concepts encompassed in this item are the BRA's desire for a change in the form of the building along the south side of Stuart Street and the uses to be conducted in such changed building form which encourage pedestrian activity. The BRA has explicitly requested the construction of additional retail space at grade on the south side of Stuart Street.

The proposal submitted responds to that request by incorporating the construction of a one-story, stepped, glass walled structure between column lines 18 and 23 built as an expansion of the original entry to the Central Area retail mall. This addition adds approximately 7,300 square feet of new rentable retail space at grade on the south side of Stuart Street. (See "Central Area Key Plans") The addition of this 7,300 square feet of glass enclosed retail space more than doubles the visually open, active space on the Stuart Street edge of the Central Area.

The decision to build a structure of this size was made in light of the following factors:

A. The deck being built over the Massachusetts Turnpike slopes to acccommodate grade changes between the Central Area and adjacent public streets. The area of the deck incorporated into the retail expansion slopes at a 1% grade. The area beyond the proposed retail expansion slopes at a grade as severe in places as 7%. By way of reference, a 7% grade is too steep for wheelchairs and is the maximum grade permissible on a federally funded highway. Certainly it is inappropriate for the conduct of retail trade. Any remedy to the excessive slope by building platforms would add such significant weight to the load on the Turnpike deck as to require the complete redesign of the entire structural system for the deck. Therefore, we have confined the new retail structure to areas of the deck having an acceptable grade.

[illegible] grade & redesign

B. Any construction to be built upon the deck must be a maximum one-story structure. All glass clear story construction such as that proposed in our submission is extraordinarily expensive; more expensive than the overall construction cost of retail space within the Central Area mall. This glass shed will cost over $150 per square foot to build as compared to approximately $115 per square foot which is the cost of space in the Central Area mall. The rental which can be generated for this satellite retail space is significantly lower than the rental to be generated for space within the mall. Since the mall is not built at grade, the satellite space cannot be integrated into the mall. Thus, we predict an ability to generate only $10 per square foot in the satellite retail space. In contrast, the Central Area mall will rent for $25 or more per square foot as a base rent with additional rent through participation in a percentage of sales.

C. Two other practical constraints have limited the size of the satellite retail space. Air intake louvres for turnpike ramp ventilation are located just to the west of the location of the proposed glass structure. These louvres would be blocked by further westward extension of the retail structure requiring redesign of the mechancial system for the turnpike ramp. In addition, emergency egress stairs for the office tower and Central Area retail mall exit just to the west of the proposed glass building. Emergency egress stairs cannot exit through retail space. Thus, an expansion of the glass shed to the west would also entail the redesign of emergency egress for the office and retail portions of the project.

II. The architectural treatment of Copley Place elevations along the Southwest Corridor deck.

[Presentation Material: Southwest Corridor Elevation and Perspective]

Both the BRA staff and the members of the Design Advisory Group have expressed a desire to create architectural relief of what they consider an expansive, unbroken elevation along the Southwest Corridor deck which was shown in the plans referenced in the Design Review Agreement. In discussing the solution submitted to this item, it is important to remember the activities occurring behind the wall of the project which faces the Southwest Corridor which are responsible for the limitations upon our ability to alter the design in this area. The portion of the project in question is the south wall of the Central Area between the east end of the housing element of the project and Dartmouth Street.

The major activity occurring behind this wall in the interval between the housing and the Neiman-Marcus store is a live turnpike exit ramp which curves around behind the wall one level above the Southwest Corridor deck. Also located in this area, at the level of the deck, is a massive fan room in which all of the ventilation fans for the turnpike exit ramp, the Marriott garage and the Central Area garage are located. That fan room is located proximate to the areas being ventilated and should not be relocated because any alternate location would result in a less energy efficient and more costly design.

Since the activities behind the Southwest Corridor elevation are fixed and unalterable, we have chosen to create relief in the facade through a series of architectural treatments. These include the following:

A. The creation of a vertical notch between the Neiman-Marcus store and the balance of the Central Area.

B. An alteration of the pattern of bays in the Central Area segment of this elevation reducing the bay width from 42 feet to 21 feet by the addition of columns to pick up the rhythm of the bay design of the housing.

C. We have added interest to the elevation by building a curved wall to house the turnpike ramp.

D. We have added two rows of windows between columns C18 and F21 and G22 and K25.

Countless other solutions have been considered but cannot be pursued because of the constraints presented by the turnpike ramp and construction adjacent to planned construction in the southwest corridor. For example, we had considered constructing a brick wall repeating the bay pattern of the housing in this area of the Southwest Corridor elevation. While such architectural treatment was not considered compatible with the balance of the facade treatment of the Central Area, it was nevertheless studied as a possible alternative. It proved infeasible for these reasons. First, the bays would encroach into the Southwest Corridor right of way where we have no property rights. Second, even if property rights could be acquired, brick construction would require the use of construction scaffolding over the Southwest Corridor in contrast to the crane-lowered precast construction planned for the balance of that elevation. This would destroy the construction sequencing for the Central Area which is tied to the rotation of a central construction crane. Each of the other solutions we have considered have been as carefully analyzed and have posed similar insurmountable problems.

III. The architectural treatment of the Marriott Hotel tower elevations.

[Presentation Material: Huntington Avenue Elevation, Harcourt Street Elevation and Perspective]

This open design item has once again been interpreted by BRA staff and the Design Advisory Group as a pursuit of architectural solutions to minimize what they consider largely unrelieved walls which face the South End residential neighborhood. Working with our architects we have incorporated the following changes in the design for the Marriott Hotel, almost all of which represent the incorporation of glass or windowed areas not originallly shown in the plans for this element of the project. The specific proposal before you incorporates the following changes:

A. The incorporation of pedestrian level glass and the elimination of a vehicular drive to provide active use at the intersection of Harcourt Street and Huntington Avenue.

B. Windows for offices have been incorporated in a terraced fashion at the east end of St. Botolph Street on the Harcourt Street elevation.

C. The formerly blank wall at the outside corner of the hotel tower is now a windowed wall because guest rooms have been located behind the elevators.

D. Considerably more glass has been incorporated in the podium levels on the Huntington Avenue facade and the Harcourt Street facade.

E. A landscaped visual screen has been added at the service entrance.

F. The window pattern shown in the original design has been altered to incorporate a number of square windows.

IV. The design and form of the housing element of the project.
[Presentation Material: Southwest Corridor Elevation, Harcourt Street Elevation and Perspective]

At the time of the execution of the Design Review Agreement, a design for the housing had been submitted which located the housing in relation to other elements of the project and suggested the architectural treatment of the building. Because that architectural treatment had not received the same amount of detailed attention as other design elements of the project, the final architectural treatment was left on the list of open design items.

The objections which were raised to the original design of the housing as presented in the plans attached to the Design Review Agreement and our response to them follow.

A. The original proposal for exterior material for the housing was a combination of brick and precast or mineralite. In response to the BRA's suggestion, the exterior material is now all brick thus making the exterior more in keeping with surrounding residential architecture.

B. The shared bay windows shown in the original design of the housing have been modified and expressed as pairs of individuals bays to create greater definition.

C. In response to the BRA's comment that the parapet line of the housing was too high, the roof line of the housing has been stepped from a high point at the intersection of Harcourt Street and the Southwest Corridor down to the parapet line of the Central Area and the Marriott Hotel.

D. The building has been set back along Harcourt Street and the Southwest Corridor deck to create private yards for apartment units at grade.

E. The floor level of the first floor (and therefore of the whole building) was raised to create greater privacy for first floor apartment residents. This change was in response to a specific Design Advisory Group suggestion.

F. An emergency exit from the Marriott Hotel ballroom was relocated to enable the construction of contiguous housing on the first floor.

V. The specific treatment of the proposed Westin Hotel Cafe.

[Presentation Material: Dartmouth Street Elevation and Perspective]

This open design item when placed on the list attached to the Design Review Agreement was meant to leave open the question of the width of the sidewalk on Dartmouth Street which would result from the extension of a glass enclosed cafe from the Hotel Boston on to Dartmouth Street. That issue was quickly resolved with an agreement on the part of the City that the sidewalk width shown on Dartmouth Street was, in fact, adequate. BRA staff has expanded its interpretation of this open design item to include the architectural treatment of all of the elevations of the hotel building and the paving surrounding the building.

that

?

It should be noted that these elevations were approved by the execution of the Design Review Agreement. Therefore, BRA pursuit of requested design changes has exceeded the letter and the spirit of the agreement. Nevertheless, UIDC has been extremely responsive to requested changes in both the facade and paving treatment of the Hotel Boston as follows:

approved at the level of schematic

A. A strip of windows at level 5 in the podium of the Hotel Boston has been added around the building between the following column locations:

At Stuart Street - 1 and 2
29 and 20

At Dartmouth Street - A and N

At Huntington Avenue - 30 and 35
39 and 47
49 and 19

By the addition of all of this additional glazing we have been forced to redesign the heating and ventilation capacity of the plant in the building which had been designed solely for the capacity necessary for a building without this additional glass.

B. All curb cuts servicing the hotel have been redesigned from concrete paving to continuous brick paving to create a consistent five foot sidewalk band around the hotel.

VI. The treatment of the Neiman Marcus exterior elevations along Dartmouth Street.
[Presentation Material: Dartmouth Street Elevation and Perspective]

This is another open design item in which our objective has been to respond to a request that a more interesting elevation be designed than that shown in the plans annexed to the Design Review Agreement. Our architects have responded to that objective in three ways:

A. A portion of the exterior wall along Dartmouth Street has been recessed to create interest, resulting in a loss of first floor retail space of approximately 20 square feet.

B. Showcase windows have been added to the exterior replacing approximately 60 square feet of first floor retail space.

C. Three different pre-cast textures will be used on these elevations to create additional visual interest.

VII. The design of the glass shed structure connecting Back Bay Station Tunnel and South Mall entrance.
[Presentation Material: Southwest Corridor Elevation and Perspective and Central Area Key Plans]

At the time of the execution of the Design Review Agreement, the existing design of the mall entrance on the south side of the Central Area was criticized for being of lesser architectural importance than other entrances to the project. A new glass shed entryway of the same design family as the other entrances to the mall containing approximately 2,000 square feet has been added in response to this item.

VIII. Satisfactory resolution of issues concerning the landscape design of the Turnpike deck cover, and architectural treatment of the adjacent Stuart Street facade.
[Presentation Material: Illustrated Site Plan and Stuart Street (Central Area) Facade]

This open design item is obviously related to the first open item on the list. To the extent that this item relates to the architectural treatment of the Stuart Street facade of the project, the response to Item I is equally applicable in this case. In addition to the building of the satellite retail structure described under item I, we have modified the Stuart Street facade of the Central Area by expressing the function of the turnpike exhaust and adding to the exhaust structure a glass block wall at the pedestrian level to add visual interest to the wall. In addition, two levels of windows have been incorporated between column lines 4 and 12.

The balance of our response on this item addresses the landscaping of the turnpike deck cover. Large trees are shown in this design in all places where it is feasible to support the weight of such trees with the structural system of the deck cover. Ivy ground cover is specified together with smaller varieties of trees and shrubs for the balance of the deck and represents the maximum amount of landscaping that can be supported by a deck cover.

— do we have any spec's on lighting?

IX. Satisfactory resolution of the establishment of measures to mitigate pedestrian level winds including any wind tunnel testing necessary to investigate any such measures.
[Presentation Material: Wind Consultant's Report]

We had much discussion of wind mitigation measures in connection with the issuance of a foundation permit for the Hotel Boston. During that process UIDC asked its wind consultants to undertake additional analysis of various wind sensitive points and to suggest specific measure that would mitigate any undesirable wind conditions. The result of all of the various studies which have been conducted has suggested that pedestrian wind mitigation can be successfully achieved through localized control by means of canopies, trees, or other energy dissipators.

BREAKDOWN OF ADDITIONAL PROJECT COSTS

The preceding section of this submission has described UIDC's proposed solutions to the open design items and the background for the selection of the solutions. Each solution has a price tag. While any one item may appear to entail only a inconsequential cost to the project, the aggregate cost of the solutions proposed in this submission is staggering. The following are the cost estimates for implementing the solutions suggested.

[illegible] 1,100 ft
approx.

I.	Cost of satellite retail space	$1,095,000
II.	Southwest Corridor deck facade changes	
	A. Notch between Neiman-Marcus and balance of central area	150,000
	B. Alter bay pattern	200,000
	C. Add two rows of windows	55,000
III.	Marriott Design changes	250,000
IV.	Housing design changes	150,000
V.	Hotel Boston facade and paving	
	A-1. Add 4650 square feet of glazing	93,000
	A-2. Up-grade HVAC system	50,000
	B. Change paving from concrete to brick	10,000
VI.	Neiman-Marcus facade changes	
	A. Recess wall	8,000
	B. Add showcase windows (replace pre-cast with glass)	2,000
	C. Vary pattern of pre-cast	21,000
VII.	South mall entrance	255,000
VIII.	Landscaping design and architectural treatment of turnpike deck cover and Stuart Street facade	
	A. Articulate turnpike exhaust structure	40,000
	B. Add 3036 square feet of glazing	61,000
IX.	Wind Mitigation	
	A. Add canopy on Hotel Boston	200,000
	TOTAL	$2,640,000

the only
mitigation?

GRAPHIC EXHIBIT LIST

1. Site Plan: Urban Design Recommendations
2. Site Plan: BRA Open Design Issue Responses
3. Site Plan: Elevations Locator Plan
4. Perspective: Westin Hotel from Copley Place Square
5. Perspective: Westin Hotel Entry (closeup)
6. Perspective: Marriott Hotel from Prudential Center
7. Perspective: Housing from Harcourt Street
8. Perspective: Central Area from Dartmouth Street
9. Perspective: Central Area from Southwest Corridor
10. Perspective: Central Area transverse section
11. Elevation: Huntington Avenue
12. Elevation: Stuart Street (Westin Hotel)
13. Elevation: Stuart Street (Central Area)
14. Elevation: Dartmouth Street
15. Elevation: Southwest Corridor
16. Elevation: Harcourt Street
17. Site Plan: Illustrated Landscaping and Interior Street
18. Model: Stuart Street Deck Entry
19. Floor Plans: Westin Hotel Working Drawings (See Floor Plan List)
20. Floor Plans: Marriott Hotel Schematic Design (See Floor Plan List)
21. Floor Plans: Housing Scematic Design (See Floor Plan List)
22. Floor Plans: Central Area Key Plans (See Floor Plan List)
23. Building Materials Sample Boards (See Material Board List)

FLOOR PLAN LIST

Westin must
show [illegible] third and
but not include [illegible]
design diagrams.

Drawing #	Drawing Title	Date
WESTIN HOTEL-WORKING DRAWINGS		
4.001	Level 101 West Floor Plan	4/1/81
4.002	Level 101 East Floor Plan	4/1/81
4.003	Level 110 West Floor Plan	4/1/81
4.004	Level 110 East Floor Plan	4/1/81
4.005	Level 120 West Floor Plan	4/1/81
4.006	Level 120 East Floor Plan	4/1/81
4.007	Level 138 West Floor Plan	4/1/81
4.008	Level 138 East Floor Plan	4/1/81
4.009	Level 156 West Floor Plan	4/1/81
4.010	Level 156 East Floor Plan	4/1/81
4.011	Level 174 West Floor Plan	4/1/81
4.012	Level 174 East Floor Plan	4/1/81
4.013	Level 188 West Floor Plan	4/1/81
4.014	Level 188 East Floor Plan	4/1/81
4.015	Level 200 Mech Floor Plan	4/1/81
4.016	Level 226 Guest Rm Tower Floor Plan	4/1/81
4.017	Level 235-244 Guest Rm Tower Floor Plan	4/1/81
4.018	Level 253-478 Guest Rm Tower Floor Plan	4/1/81
4.019	Level 487 Guest Rm Tower Floor Plan	4/1/81
4.020	Level 499 Mech Floor Plan	4/1/81
4.021	Level Roof Plan	4/1/81
MARRIOTT HOTEL - SCHEMATIC DESIGN		
2.	Basement & Parking Level 1 Floor Plan	4/13/81
3.	Mezzanine & Parking Level 2 Floor Plan	4/13/81
4.	First Floor & Parking Level 3 Floor Plan	4/13/81
5.	Parking Levels 4 & 6 Floor Plan	4/13/81
6.	Second Floor & Parking Level 5 Floor Plan	4/13/81
7.	Third Floor & Parking Level 7 Floor Plan	4/13/81
8.	Fourth Floor Plan	4/13/81

FLOOR PLAN LIST (Continued)

Drawing #	Drawing Title	Date
MARRIOTT HOTEL - SCHEMATIC DESIGN (Continued)		
9.	Fifth Floor Plan	4/13/81
10.	Mechanical Level Plan	4/13/81
11.	Sixth Floor through 26th Floor Plans	4/13/81
12.	27th & 28th Floor Plans	4/13/81
13.	29th & 30th Floor Plans	4/13/81
14.	31st Floor Plan	4/13/81
15.	32nd through 35th Floor Plans	4/13/81
16.	36th Floor Plan	4/13/81
17.	37th Floor Plan	4/13/81
18.	38th Floor Plan	4/13/81
19.	Penthouse Floor Plan	4/13/81
HOUSING-SCHEMATIC DESIGN		
1.	Ground Floor Plan	4/6/81
2.	Second & Typical Floor Plans	4/6/81
3.	Ninth & Tenth Floor Plans	4/6/81
CENTRAL AREA-KEY PLANS		
KP 1.	Key Plan Level 1	4/27/81
KP 2.	Key Plan Level 2	4/27/81
KP 2½.	Key Plan Level 2½	4/27/81
KP 3.	Key Plan Level 3	4/27/81
KP 4.	Key Plan Level 4	4/27/81
KP 5.	Key Plan Level 5	4/27/81
KP 6.	Key Plan Level 6	4/27/81
KP 7.	Key Plan Level 7	4/27/81
KP 8.	Key Plan Level 8	4/27/81
KP 9.	Key Plan Level 9	4/27/81
KP 10.	Key Plan Level 10	4/27/81
KP 11.	Key Plan Level 11	4/27/81

FLOOR PLAN LIST (Continued)

Drawing #	Drawing Title	Date
CENTRAL AREA-KEY PLANS (Continued)		
KP 12.	Key Plan Level 12	4/27/81
KP 13.	Key Plan Level 13	4/27/81
KP 14.	Key Plan Level 14	4/27/81
KP 15.	Key Plan Level Roof	4/27/81

MATERIAL BOARDS LIST

#	Material	Location
1.	Precast Concrete	' Central Area: Podium ' Central Area: Neiman Marcus* ' Marriott Hotel
2.	Precast Concrete	' Central Area: Tower
3.	Precast Concrete	' Westin Hotel*
4.	a) Window Frame & Glass	a) Central Area: Tower & Podium
	b) Louvers	b) Central Area: Podium
5.	a) Window Frame & Glass	a) Central Area: Neiman Marcus
	b) Metal Panel	b) Central Area: Neiman Marcus
6.	Window Frame & Glass	' Westin Hotel ' Marriott Hotel
7.	Window Frame & Glass	' Housing
	Brick	' Housing
8.	a) Metal Fascia	a) Westin Hotel: Canopy
	b) Stainless Steel Door	b) Westin Hotel: Entries
9.	Metal Panel	' Central Area: Turnpike Exhaust
10.	Glass Block	' Central Area: Turnpike Exhaust
11.	a) Brick	' Total Complex: Paving
	b) Granite	' Total Complex: Paving

* Also see board mounted blow up photos.

ARCHITECTURAL DESIGN PHILOSOPHY

A. CENTRAL AREA

Overall

Central Area has been designed as a "layered" horizontal expression, recalling the banded masonry effect prevalent in many prominent Back Bay buildings, e.g. Trinity Church. This formal vocabulary is further refined to express the distinct identity of project elements while cohesively tying the overall project together. The major exterior building material of Central Area will be precast concrete. This material provides a three-dimensional masonry-like appearance while affording economy of construction not feasible in homogeneous stonework,. The color will be similar to the "warm" stone of buildings in Copley Square. The surface of the panels will be articulated using rustification grooves in varying widths and depths and a variety of scale, texture, and color. Variation in color is achieved by the degree to which the warm stone aggregate concrete is exposed. The final effect of the varied concrete treatment, combined with glass & louvers, will be sympathetic to the commercial and institutional character of Boylston Street and Back Bay and will complement the adjoining residential neighborhood.

Stuart Street Deck Entry

The Stuart Street entry has been designed to extend retail street life activity further on the Stuart Street Turnpike deck cover. The massing is stepped up from the Stuart/Dartmouth plaza up to the Central Area building to express the upward pedestrian movement, and provide a massing transition from the pedestrian scale of the entry to the retail and office areas. The shape of the entry plan has been designed as an extension of the geometry of the Central Area, spatially enclosing the Stuart Street plaza on one side and the Turnpike cover space on the other. Because the entry is composed of horizontal glass bands, the activities and interior treatment within will be highly visible -- day and night. While unifying the interior life with paved outdoor landscaped areas, the entry will be a major activity generator and gathering place.

Southwest Corridor Elevation

The Southwest Corridor treatment is such that textures and articulation will vary from level to level, expressing layers, banding, and internal uses. The basic structural bay allows a horizontal dimensional expression of 21 feet, recalling the typical South End housing unit structural width. A vertical notch has been added to visually separate the retail area from the Neiman-Marcus store. A similar notch between the housing and retail elements provides a similar function. The pedestrian zone has been designed to add scale and variety along the length of the facade. A recessed zone has been established wherever possible. The Turnpike ramp section of the facade has been recessed and follows the curved plan of the ramp. Neighborhood retail glass fronts will activate a substantial length of the facade. ?

A separate identifiable glass enclosed mall entry will extend out from the facade, inviting people to participate in the life of Copley Place. Glass has been added on both retail mall levels to open the activity to view, giving visual depth and scale while helping to assure that no edge is treated as a back side.

Southwest Corridor Deck Entry

As mentioned before, a glass-enclosed building element has been extended onto the Southwest Corridor deck to bring the activity of the mall out onto the plaza, make a link to the South End neighborhood, and to make a direct weather-protected connection to the Back Bay Station.
The entry has been designed to integrate the geometry of the retail and office building to that of Dartmouth Street. Treated in a similar formal vocabulary to the other mall entries, the Southwest Corridor entry will be composed horizontally expressed in glass bands, planting, and warm floor materials. This entry element will unify the neighborhood retail frontage with the Southwest Corridor Deck space and the Neiman-Marcus--providing a protected meeting place before entering Copley Place.

Neiman Marcus Elevation

The integrity of Neiman-Marcus as a top-quality store will be expressed by the use of a large showcase window recess at the pedestrian level, surrounded by banded concrete panels with subtle variations of color, texture, and delineation. The Dartmouth Street facade will have glass showcase and entry elements on the ends with small showcase elements (vitrenes) set into the precast which, in concert with paving, trees, and landscaping, will continue the activity and life of the Dartmouth Street Mall.

Stuart Street Facade

The treatment of the Stuart Street facade expresses a variety of uses and has been scaled down with the use of massing modulation, material variety, and a rigorous articulation of precast, that segments the length of that facade into distinct sections. Like the Dartmouth Street facade, the Stuart Street facade of the Neiman-Marcus store stands as a distinguished face to the Dartmouth/Stuart Street plaza, expressing glass-enclosed showcases and entry recesses surrounded by banded concrete panels with subtle variations of color, texture, and delineation. As discussed before, in response to B.R.A.suggestions, the Stuart Street entry has been expanded and will step down from the retail mall and office building to develop an identifiable building element. It's mass will help enclose the Stuart Street plaza, and insure that the activity generated there will make the plaza an important place.

In the middle of the facade, the Turnpike exhaust structure will be directly in front of the middle of the office buildings. The elements of the Turnpike exhaust structure make a distinct composition subordinate to the overall Stuart Street facade. The pedestrian level zone is recessed and built of glass block, allowing the light from within to give life to the facade. Above

the pedestrian level on grade, the middle zone will be articulated with a variety of precast textures, rustication, and punched periodically by mechanical louvers. The Upper zone will give roofline modulation and will express the exhaust tube/towers. The facade on both sides of the exhaust structure has incorporated windows on both retail levels, giving an additional feeling of life to the facade -- day and evening.

B. HOUSING

The design objective for the Copley Place Housing is to accomodate 100 units of new housing in a structure which acts as a transitional element between the major, non-residential forms of the Central Area & Marriott Hotel and the small-scale brick townhouses of the South End. The design is an "L" shaped brick rectangular mass articulated by a repetitive pattern of paired projecting bays which step from eights and ten stories in height. The base is recessed with an expressed colonnade on a 25'-0" grid. Programmatically, the housing consists of a two-story base which is composed of townhouse-type units with direct grade entry; a middle portion of the building which consists of bow front flats; and the stepped upper levels of penthouse apartments. The housing has been designed to complement both the South End housing and the rest of Copley Place Complex. The repetition of paired 12'-0" bays evokes the residential texture of the South End while reading through as a larger module related to the forms of the main Complex. Similarly, 25' rhythms of the recessed colonnade at the base defines the individual townhouses at Ground level and echoes the column spacing of the recessed areas along the Southwest Corridor. This horizontal continuity between neighboring development elements is also accomplished by carrying a pattern of recessed openings to band the upper two levels of the housing component. The parapet height at the eighth floor setback aligns with the parapet of the Central Area @ the Southwest Corridor as well as that of the Marriott Hotel on Harcourt Street. By incorporating elements of form and rhythm that carry throughout, the design will express the housing as a separate entity, link it to the main complex, and complement adjacent South End townhouse forms.

C. WESTIN HOTEL

The facade of the Westin Hotel is designed in layers, or zones, that respond to the proportions of the Boston Public Library, and the precast skin is designed in the spirit and scale of the masonry used in both the Boston Public Library and the Copley Plaza Hotel. The precast concrete panels are articulated by rustication joints and grooves into a series of banded rectangles. Similar to the Central Area, the color and texture will be subtley varied in bands to simulate the tones and color of the Copley Square historic buildings. In formal acknowledgement of completing the corner on Copley Square, a large glass corner entry will address the Square. The cornice line is level with the Copley Plaza Hotel. A band of glass has been added at the upper level of the podium to lighten the mass along Dartmouth Street. The glass band will cap the rotunda facing Copley Square, extend down Dartmouth Street, and wrap around the Stuart/Dartmouth corner to cap the faceted corner of the building as well. Pedestrian level scale is achieved by adding glass restaurant sheds in keeping with the character of the Newbury Street sidewalk cafes and

street activity. The progression of the sheds, constructed of glass to within three feet of grade, down the Dartmouth Street Mall, maintains a visually active edge from Copley Square corner to the Dartmouth/Stuart Street Plaza and encourages participation by pedestrians as well as hotel guests.

The materials of the Dartmouth Street Mall have been continued along the Westin Hotel streetscape by incorporating continuous brick paving, granite edge strips, trees, and lighting elements. The extended Mall becomes a link from Newbury and Boylston Streets providing both access and invitation. Specific architectural features have been added to mitigate pedestrian level winds. At the auto entry on Huntington Avenue, a canopy has been provided over the drop-off area to provide both scale and to deter winds coming down the face of the Westin Hotel tower. In addition, wind kiosks have been studied for mitigation wind at the Huntington Avenue sidewalk. The goal is to redirect or deflect the prevailing winds away from pedestrians.

D. MARRIOTT HOTEL

The facades of this 1,100-room convention facility harmonize with the rest of the Copley Place Complex by using the same exterior materials and respecting the overall project vocabulary. However, the form and fenestration of the guest room tower distinctly expresses Marriott's separate identity within the overall project. The principle hotel entry facing Huntington Avenue has been redesigned to create a welcoming four-story glass link between the guest room tower and the solid volume of the Central Area. This facade incorporates the Huntington Avenue entrance into the shopping mall and receives the pedestrian bridge spanning Huntington Avenue from the Prudential Center. The glassed enclosure steps back from the street admitting north light into a large atrium. This multi-story space includes a variety of hotel functions such as the lobby, lounges, and a cafe as well as the escalators from the street level entrance to the shopping mall. Pedestrians circulating between the new Back Bay Station and the Prudential Center will pass through this space. As with the Westin Hotel, hotel funtions and pedestrian access to the other elements of the Complex are integrated, therby including, rather than excluding, people who are not hotel guests. The automobile arrival has been scaled down to minimize disruption of pedestrian activities at sidewalk level. The brick paving will continue across the two vehicular lanes. By pulling back the shear walls that previously presented a blank facade at street level, it was possible to introduce a lounge and bar at sidewalk level at the corner of Huntington Avenue and Harcourt Street. Similarly, glass areas where added at the lower five levels of the podium at Harcourt Street, thus eliminating the windowless walls facing the residential neighborhood.

The exterior treatment of the facade consists of bands of clear glass alternating with precast concrete panels of the same color and texture to be found on the Central Area.

The most dramatic change was achieved by the addition of guest rooms behind the elevator walls, thus adding windows on the side most visible from St. Botolph Street. To break up the continuous horizontal glass bands, square

windows were introduced in a random pattern into the south, west, and elevator wall tower elevations.

A five-story terraced element was added directly over the service entry on Harcourt Street, to strengthen the link between the Housing and the Marriott Hotel tower. This stepped mass provides screening of the service-related hotel facilities and the garage. It is now possible to terminate the St. Botolph Street vista with windows rather than a blank wall.

E. LANDSCAPING

The facades will be softened dimensionally and visually by the extensive use of landscaped foreground, base features, and tree placement. At the intersection of Stuart and Dartmouth Streets, a brick-paved plaza with granite edge strips will tie the Dartmouth Street character to the Central area entry. Also a major sculpture centerpiece and granite steps reinforce the space as a focal point. The steps and landscape retaining walls will provide open and shaded places for people to meet friends and rest. Beyond the Stuart/Dartmouth entry, and over the Turnpike paving, ground cover and trees will establish a warm, lively landscaped edge to the Stuart Street facade. A paved area will give outdoor frontage to the entry retail component and will be adjacent to a green ground cover area. A line of trees will soften the building mass behind.

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Bolt Beranek and Newman Inc.

April 28, 1981

Urban Investment and Development Company
John Hancock Tower
200 Clarendon Street
Boston, MA 02116

Attn: Mr. Kenneth A. Himmel, Sr. Vice President

Subject: Open Design Item No. 9; "Satisfactory Resolution of the Establishment of Measures to Mitigate Pedestrian Level Winds, Including any Wind Tunnel Testing Necessary to Investigate".

Gentlemen:

This letter summarizes the results of the wind tunnel studies of localized wind mitigation measures around the Westin Hotel. The rationale for investigating these measures has been previously stated in References 1-3.

We have found that the localized mitigation measures provide significant reduction of wind in critical areas around the project, in some cases actually reducing wind speeds below the present day ("no-build") conditions. These reductions occur without producing increases in wind elsewhere. The attached report (Ref. 4) summarizes the study and its findings.

The measures investigated included a series of canopies along the Huntington Avenue side of the Westin tower, tree plantings in accordance with the current landscape plan, and specially-designed "kiosks" located in groups around the three corners of the triangular Westin site. The attached data shows that the canopy provides localized relief, as expected; the trees provide meaningful reductions in windiness all around the project, and "kiosks" can be used to further incrementally reduce winds in most areas. We note that there may be areas in the immediate vicinity of the kiosk bases where no reduction in wind would be achieved.

The measures were investigated for the Westin Hotel area only, due to the urgency of obtaining permits for that element of the project, and due to the fact that the effectiveness of the mitigation measures proposed had not been proven. Inasmuch as the localized mitigation measures have proven to be effective around the Westin, similar studies are being undertaken on other areas of the project.

If you or any of your associates have questions or comments on the attached report, we would be pleased to discuss them with you at your convenience. We look forward to being of further assistance to you and TAC on these matters. If there are questions, please do not hesitate to call.

Sincerely,

BOLT BERANEK AND NEWMAN INC.

Richard E. Hayden

Richard E. Hayden
Manager, Aero Sciences

REH/sl
Attachments

References:
(1) BBN Report 4415; "*Pedestrian Wind Environment at Copley Place, Boston, Mass.*" (Sept. 1980)
(2) R. Hayden letters dated February 19 and February 23, 1981, to Robert Ryan, Director, Boston Redevelopment Authority.
(3) R. Hayden letter, dated March 16, 1981, to U.I.D.C.
(4) BBN Report 4652, "*Wind Mitigation Measures Applicable in the Vicinity of the Westin Hotel; Boston, MA.*" (April, 1981)

cc: J.P. Brown
S.F. Eimer
G. Hislop
L. Fortier

[illegible]

Report No. 4652

WIND MITIGATION MEASURES APPLICABLE IN THE VICINITY OF THE WESTIN HOTEL, BOSTON, MASSACHUSETTS

R.E. Hayden

L.J. Fortier

April 1981

Prepared by:

Bolt Beranek and Newman Inc.
50 Moulton Street
Cambridge, Massachusetts 02138

Prepared for:

Urban Investment and Development Company
John Hancock Tower
200 Claredon St.
Boston, Massachusetts 02116

WIND MITIGATION MEASURES APPLICABLE IN THE VICINITY OF THE WESTIN HOTEL, BOSTON, MASSACHUSETTS

Introduction and Summary:

Localized wind mitigation measures have been studied to determine their effectiveness in reducing winds in key pedestrian areas around the Westin Hotel site, Copley Place, Boston. Previous wind tunnel studies of the Copley Place site have quantified the winds at 29 locations with the project in place as proposed, and compared them with the "no-build" conditions (see Fig. 1 for locations). The mean and effective gust velocities for each location are summarized in Table 1 (taken from Ref. 1, and updated as noted; terminology is explained in the footnotes and in Ref. 1).

The measures investigated included a series of canopies along the Huntington Avenue side of the Westin tower, tree plantings in accordance with the current landscape plan, and specially-designed "kiosks" located in groups around the three corners of the triangular Westin site. The devices are illustrated schematically in Figure 2. Details on their locations are presented below.

The localized mitigation measures provided significant reduction of wind in critical areas around the project, in some cases actually reducing wind speeds below the present day

("no-build") conditions. These reductions occur without producing increases in wind elsewhere. Tables 2 and 3 summarizes the relative windiness at key locations around the Westin for five conditions:

(1) No-build.

(2) Present Copley baseline design (without tree plantings).

(3) Present Copley baseline design with a canopy over a portion of the Huntington Avenue sidewalk.

(4) Same as (3) but with tree plantings (winter conditions assumed).

(5) Same as (4) but with Kiosks. — everything is included

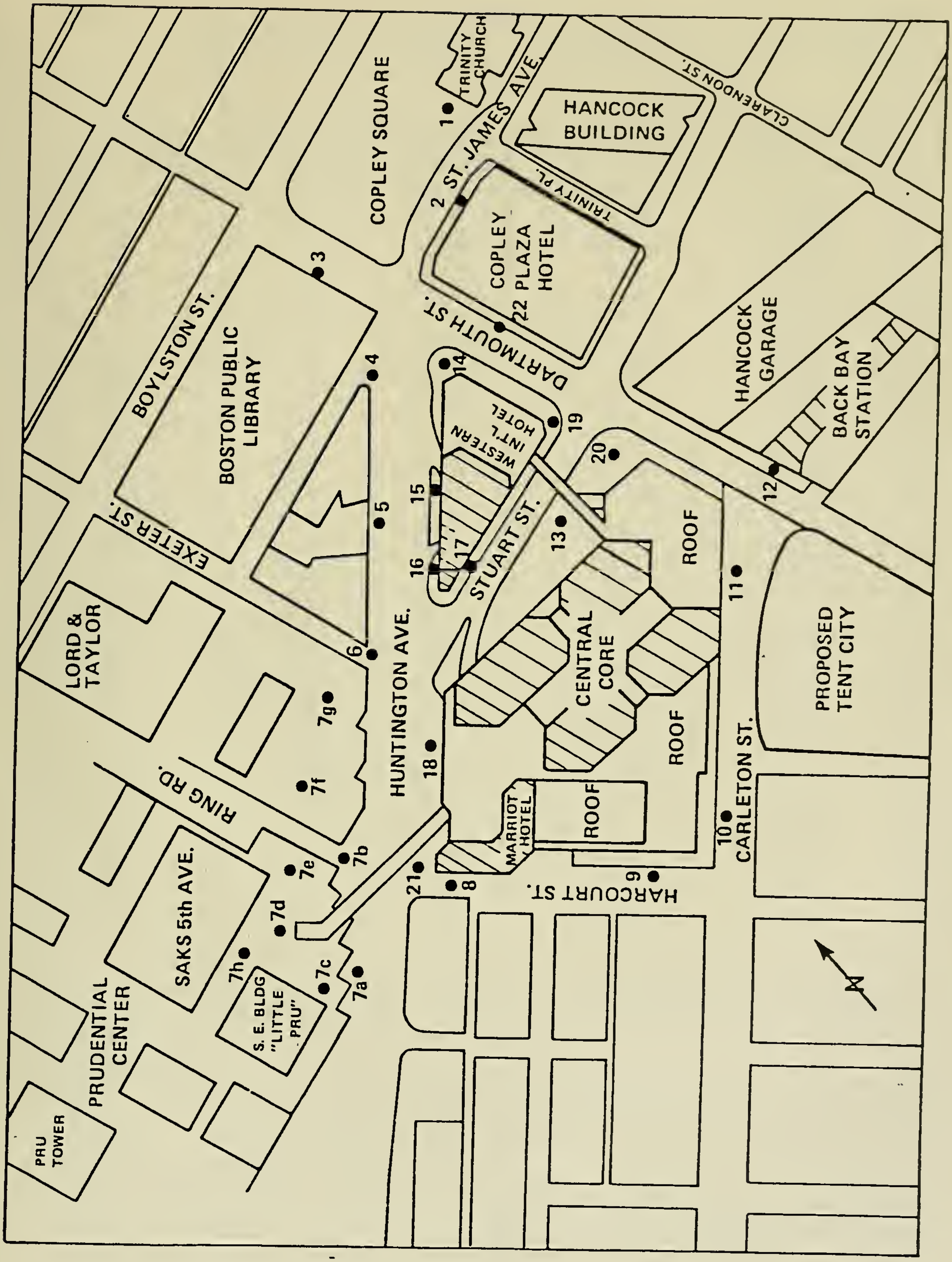

FIG. 1. COPLEY PLACE PROJECT IN RELATION TO OTHER LANDMARKS IN THE PRUDENTIAL CENTER/ COPLEY PLACE AREA (NUMBERS REFER TO PEDESTRIAN-LEVEL WIND SENSOR LOCATIONS).

TABLE 1: COMPARISON OF MEAN AND EFFECTIVE GUST WINDSPEEDS*
(Reprinted from Ref. 1, Appended as noted below)

Sensor Location (See Fig. 1)	Mean Velocity (mps)		Effective Gust Velocity (mps)	
	Existing	Proposed	Existing	Proposed
1	10.9	10.4	14.9†	14.8†
2	11.6	11.2	15.0†	14.6†
3	5.2	5.7	7.9	8.5
4	7.5	8.5	10.2	11.0
5	4.8	7.3	9.1	12.0
6	11.8	11.3	14.7†	15.1†
7a	12.0	11.7	15.4†	13.7†
7b	8.5	12.7	12.3	15.8†
7c	6.6	7.7	9.9	11.3
7d	9.1	9.3	12.5	12.9
7e	10.4	9.3	14.7†	13.7†
7f	10.5	9.8	14.4†	13.7†
7g	6.9	9.0	10.1	12.4
7h	11.3	11.4	14.0†	14.0†
8	9.6	6.9	13.1	9.8
9	4.4	7.5	6.6	10.4
10	7.2	8.3	10.4	11.4
11	6.7	9.9	9.6	12.8
12	5.6	6.0	8.5	9.4
13	8.5	9.2	11.0	12.8
14	9.9	9.3	12.5	12.4
15	6.8**	8.7	10.5**	11.7
16	6.8**	8.7	10.7**	11.5
17	7.9	9.9	11.6	12.7
18	--	7.5	--	12.0
19	9.8	10.0	13.3	13.4
20	--	5.9	--	9.0
21	11.9	11.7	14.8†	14.9†
22	9.0	8.1	11.9	11.0

*For mean windspeed, the value given will be exceeded 1% of the time. the time. For effective gust windspeed, the value given corresponds to the velocity of a sustained gust (approximately 40 sec long) with a probability of 1%.

**These values were not measured during the original survey. The openness of the existing site suggested that winds here would be similar to nearby locations. These values have been added to allow direct comparison of existing to proposed conditions.

†These values exceed a windspeed of 13.6 mps (30.5mph); this windspeed has been suggested by others as a threshold above which winds may pose hazards for frail or handicapped people. However, human perception of windiness is subjective, and a generally applicable acceptability criterion is unobtainable (see Appendix B, Ref. 1).

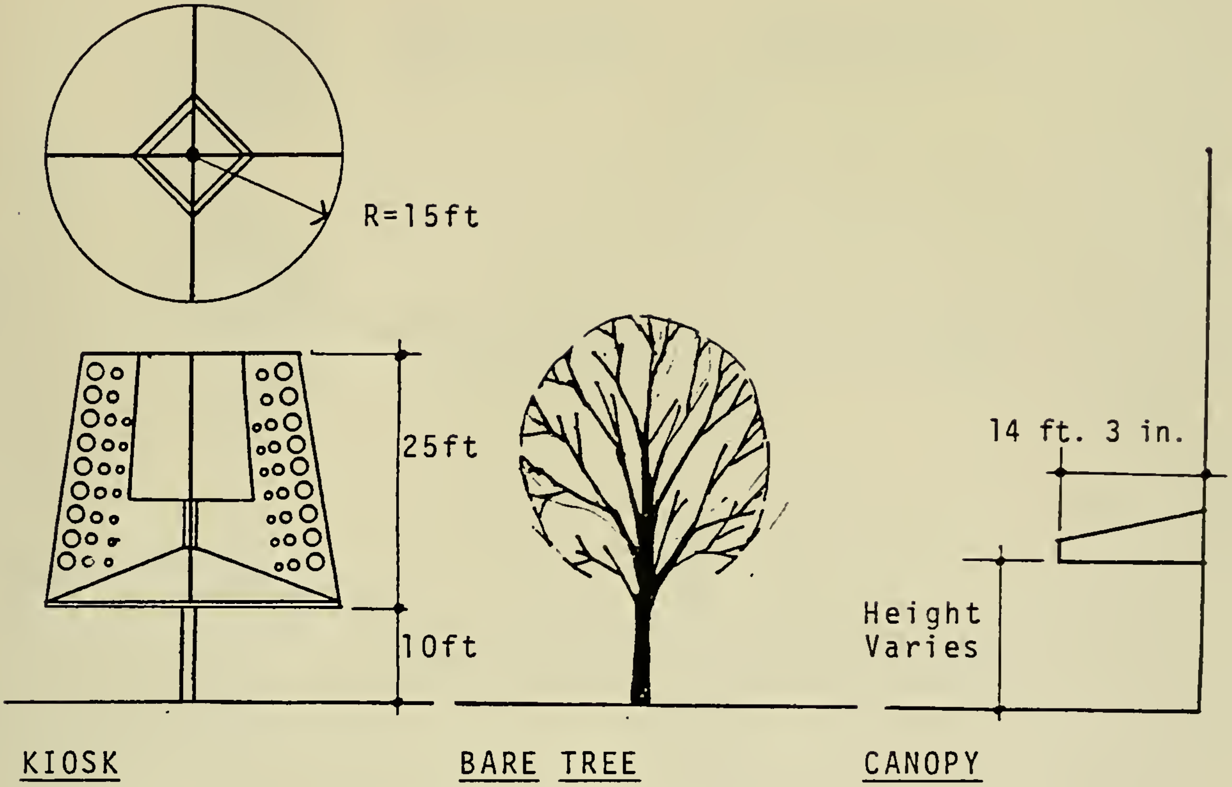

Figure 2 : Wind Mitigation Measures; Comparison of Element Scale.

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KEY LOCATION COMPARISON OF RELATIVE EFFECTIVENESS OF VARIOUS MITIGATION METHODS

TABLE 2: Comparison of normalized* mean windspeeds having a 1% probability of occurance

LOCATION SENSOR # (see Fig 1)	SITE CONFIGURATION EXISTING (NO-BUILD)	PROPOSED COPLEY PLACE BASELINE	MITIGATION SCHEME A (Canopy C)	MITIGATION SCHEME B (CANOPY C AND TREES)	MITIGATION SCHEME C (CANOPY C AND TREES, AND KIOSKS)	OPTIMUM MITIGATION EXISTING CONDITIONS
4	.88	1.00	NE**	.94	.90	1.02
5	.66	1.00	NE	.94	.96	1.46
6	1.04	1.00	NF	.85	.91	.87
14	1.06	1.00	.97	.88	.69	.65
15	.78***	1.00	.95	.94	.77	.99
16	.78***	1.00	1.00	.87	.90	1.15
17	.80	1.00	.82	.82	.70	.88
19	.98	1.00	NE	.80	.76	.78

[illegible]

TABLE 3: Comparison of normalized effective gust velocities for 1% probability of occurance

SENSOR #	EXISTING (NO-BUILD)	PROPOSED COPLEY PLACE BASELINE	MITIGATION SCHEME A	MITIGATION SCHEME B	MITIGATION SCHEME C	OPTIMUM MITIGATION EXISTING CONDITIONS
4	.93	1.00	NE	.95	.91	.98
5	.76	1.00	NE	.96	.97	1.28
6	.97	1.00	NE	.88	.93	.95
14	1.01	1.00	.98	.90	.73	.72
15	.90***	1.00	.98	.97	.83	.93
16	.84***	1.00	.97	.85	.87	1.03
17	.91	1.00	.85	.83	.74	.81
19	.99	1.00	NE	.84	.76	.77

Why the diff.?

* The predicted windspeeds have been normalized by dividing each by the value for Copley Place with no mitigating measures included. This provides for direct evaluation of improvements resulting from each degree of mitigation. Finally, the fully-mitigated level of windiness is compared to the level of windiness without the Copley Place Project ("no-build"). Where this number is less than 1.0, the winds have decreased relative to the "no-build" conditions. Table 3 lists the predicted windspeeds with and without Copley Place. The windspeeds do not take credit for the reductions reported here.

**NE = Not evaluated (location too remote from local mitigation device).

*** Note that the no-build conditions for these locations had not been previously evaluated due to their presumed similarity to nearby locations.

2. Canopies

Canopies placed near the base of a tower serve to deflect winds flowing down the face of the building away from the areas below them, as well as providing the obvious shelter from rain and snow. Several canopy schemes were tested on the Huntington Avenue face of the Westin tower. All provided local relief when winds were from the Northwest. However, several of the large canopies resulted in trapped accelerated winds beneath them when prevailing winds were blowing along Huntington Avenue. The so-called Canopy Scheme C-3 was determined to provide the most relief without creating any increases relative to the no-canopy condition. The plan view of the installed canopy is shown in Fig. 3 (recall the elevation view in Fig. 2).

The maximum relief of winds with this canopy occurs at location 17 on Stuart Street, which experiences high winds due to flow through the connector with Huntington Avenue. Note that the precise location of sensors 15 and 16 were beyond the projected edge of the canopy, thus the relatively small reductions measured. However, significant reduction of wind directly below the canopy can be expected.

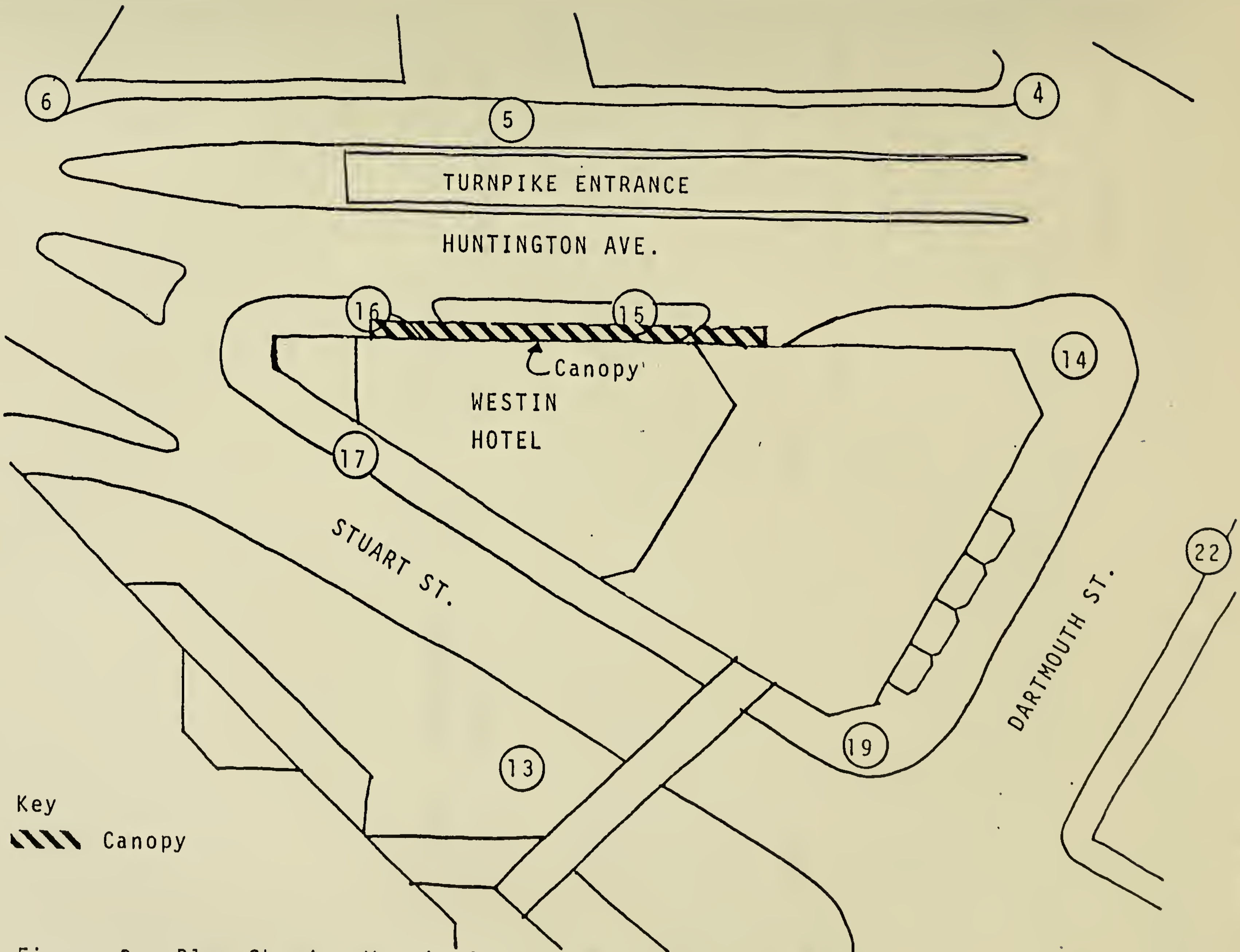

Figure 3: Plan Showing Westin Canopy; Mitigation Scheme A.

3. Tree Plantings

Trees can provide actual dissipation of wind energy, as well as reduction of winds. To accurately model the effectiveness of tree plantings on the 1/384 scale model of the Copley Place site, the downwind flow properties (wake) of live trees were measured in the wind tunnel, and then reproduced in simulated trees at 1/384 scale. The results reported in Tables 1 and 3 are for leafless ash trees of 35 - 45 foot height, the leafless condition being chosen to represent worst-case (winter) conditions. The wind tunnel results on the live trees with leaves showed that much greater reductions of wind can be expected during those seasons when the trees have full foliage.

Figure 4 shows the locations of the trees tested, which when combined with the canopy constitute "MITIGATION SCHEME B".

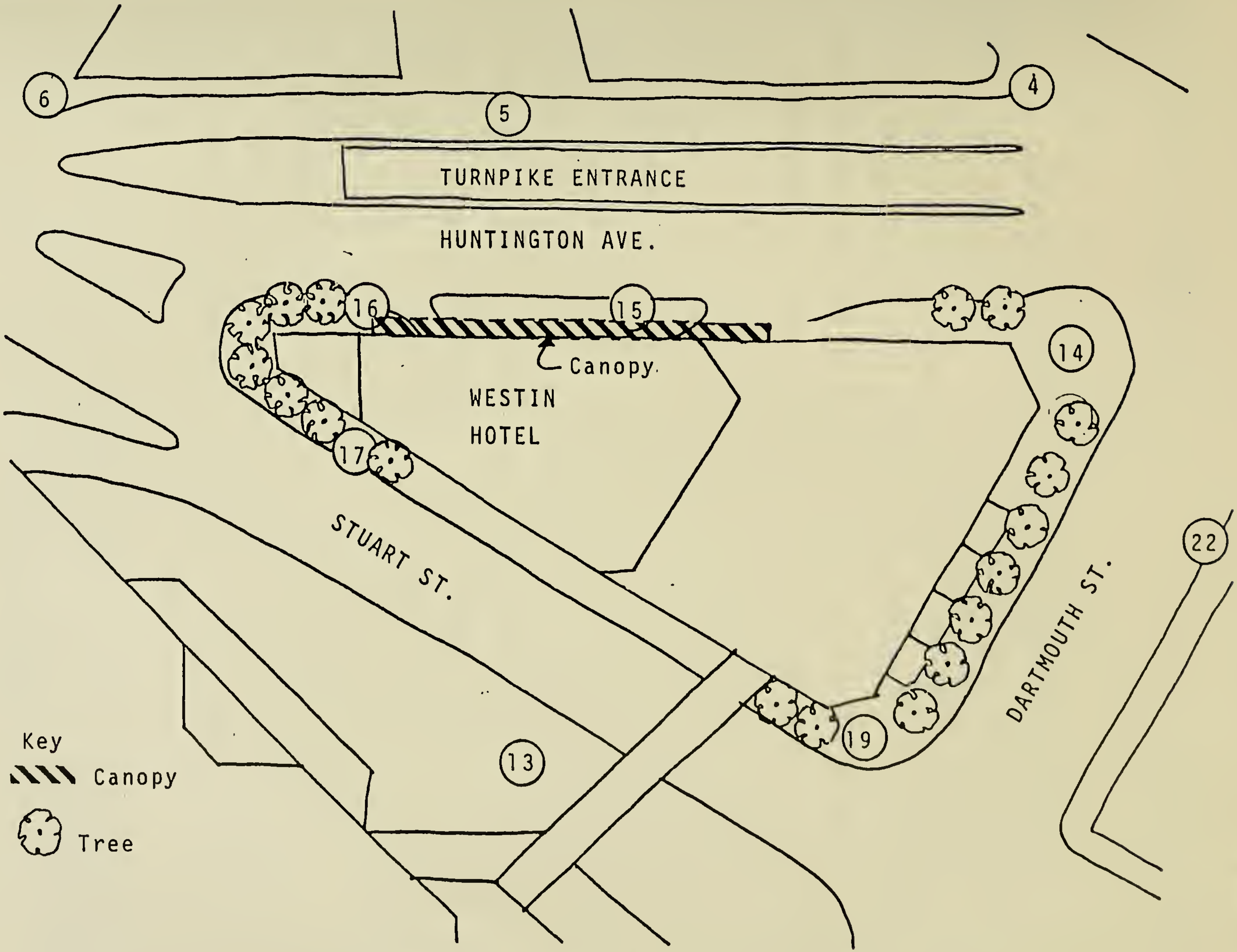

Figure 4: Plan Showing Canopy and Trees; Mitigation Scheme B.

4. "Kiosks"

It is possible to design a fixture resembling traditional urban Kiosk forms which re-direct and/or dissipate local winds. After consultation with the Architects Collaborative Inc. and UIDC on the general scale and form that such devices could take around the Copley Place site, a series of "generic" designs were developed in the wind tunnel which provided maximum reduction of downwind velocities without causing acceleration of wind in the region immediately beneath the kiosk, which would probably be a pedestrian area. The scheme shown in Fig. 2 was one such "generic" design which incorporated many of the desirable features developed - a conical bottom to divert wind upward; partially open vertical faces to create local dissipation of the wind without causing edge accelerations; and a vertical "stack" to actually direct air from the lower part of the kiosk vertically, away from the street. Other design concepts can be developed to effectively incorporate these principles. Any future designs purposed can be compared in their effectiveness to the "generic" design tested by a quick test in a conventional wind tunnel, without resorting to full tests on the Copley Place site model.

The locations tested with the kiosks in place are illustrated in Figure 5. These kiosk locations, in combination with the canopy and tree plantings, constitute "MITIGATION SCHEME C".

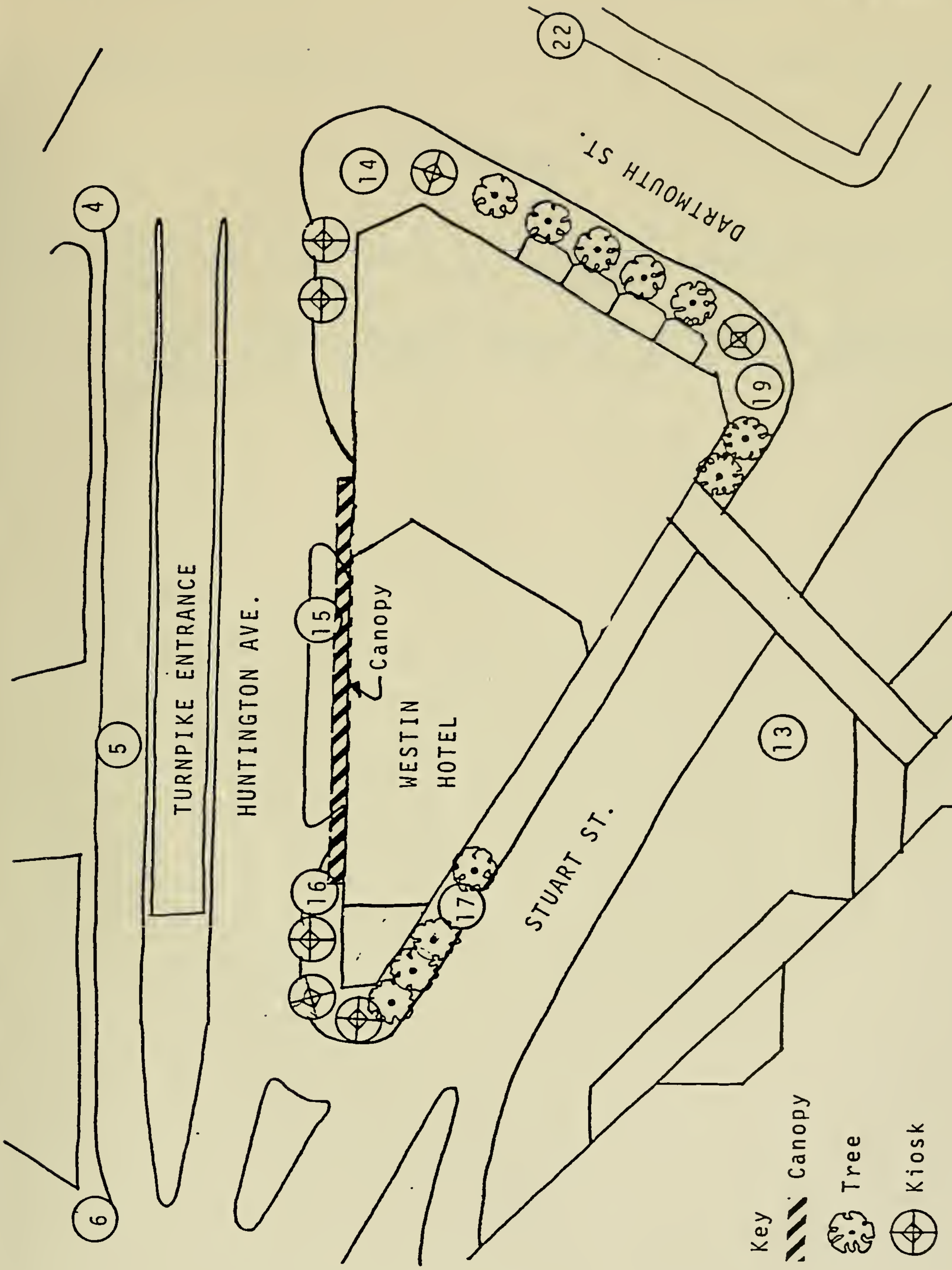

Figure 5: Plan Showing Canopy, Trees, and Kiosks; Mitigation Scheme C. Note that where present, kiosks replace trees.

REFERENCES

1. BBN Report 4415; "Pedestrian Wind Environment at Copley Place, Boston, Mass.", (Sept., 1980)

2. R. Hayden letters dated February 19 and February 23, 1981, to Robert Ryan, Director, Boston Redevelopment Authority (appended).

APPENDIX A

February 19, 1981 Letter

(Ref. 2)

50 Moulton Street
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Telex No. 92-1470

Bolt Beranek and Newman Inc.

February 19, 1981

Mr. Robert Ryan, Director
Boston Redevelopment Authority
1 City Hall Plaza
Boston, Massachusetts

Subject: Review of Massing Alternatives for Western International Hotel at Copley Place, Boston, and Their Effects on Ground Level Winds, and Impact on Other Structures

Reference: Meeting at BRA on 17 February 1981

Dear Mr. Ryan;

Our clients, Urban Investment and Development Company have asked us to respond to you directly to questions raised by Mr. Paul McCann of the BRA and other BRA staff at the conclusion of the referenced meeting during which the wind environment around Copley Place was described by the undersigned. Our purpose in this letter is to reiterate our rationale for contending that the present massing of the Western International Hotel, in particular, represents one of the best possible compromises for this project, when all the interactions with its environs are considered, and when the predictable impacts of future construction of a similar magnitude in the neighborhood are factored in.

1. History

During the several years of design development of the Copley Place Project, wind impacts have been continuously considered during the creation of the project. Our firm has supplied guidance and written opinions to Urban Investment and Development Company, which we know to be on the public record, dealing in particular with massing alternatives of the various design concepts which have been presente
The various factors taken into consideration were:

- wind at street level within the project boundaries
- wind at street level in areas immediately abutting the project, such as the Copley Plaza Hotel, the Boston Public Library, the BackBay Station, the Harcourt Street neighborhood, the site of the proposed "Tent City" project
- wind impact on more outlying areas such as Copley Square
- adverse loading of the John Hancock facade

- pollution dispersion.

The size of the project, and the relatively non-uniform way in which the highrise massing of the adjacent areas has been developed make it unlikely that pedestrian level wind impacts can be minimized in all the above areas simultaneously. Further, we have measured the effects of the Copley Place project on the facade loads of the John Hancock building, qualitatively evaluated the impact on the Copley Plaza Hotel, and monitored dispersion of air pollution from turnpike ventilation systems within the project. All of the above factors are directly affected by massing of the project. Our preliminary qualitative studies were discontinued and wind tunnel testing initiated approximately ten months ago, dealing with a design that is roughly equivalent to the present-day design of the project. Design changes which have been developed since our modeling work began have been incorporated in the wind tunnel models. Critical areas of wind impact have been identified in the draft and final environmental impact reports, and several meetings with BRA personnel have taken place, both at City Hall and at our Arlington, Mass., wind tunnel to review the findings and to explore means for mitigation of pedestrian winds.

Following a meeting at the Arlington Wind Tunnel attended by Messrs Chmura and Mertens, of the BRA, Brown of UIDC, McCandless of HMM, and McLaren, Hayden and Fortier of BBN, we explored massing alternatives for the Western International Hotel to determine if significant benefits might be gained by serious reconsideration of the massing problem. These tests consisted largely of flow visualization studies-smoke injection into the airstream and observation by trained personnel, and led to the conclusion that realistic remassing alternatives for the Western did not exist.

We advised both UIDC and the BRA of our findings and recommended the continued exploration of "add-on" modifications to buildings and/or ground-level sites to deal with localized wind problems.

At UIDC's request, we explored several candidate classes of solutions in the wind tunnel. We reported our results to the BRA in a July meeting at Boston City Hall. Certain of the measures tested appeared to be promising for the reduction of winds, both along Huntington Avenue and in Copley Square (Copley Square winds are virtually unaffected by the Copley Place project, but have been identified as among the windiest in the area due to the presence of the Hancock Building).

The remainder of this letter reviews the technical basis for the conclusion that remassing within the constraints of the building program cannot be expected to improve windiness overall.

2. Identification of Critical Wind Areas

Our previously submitted report* and several oral reports have identified areas where winds of potentially unacceptable levels may be expected. The techniques that were used to arrive at this acceptability criterion and impact estimate have been previously documented. These techniques are designed to provide the optimum daily comfort levels in and maximum useability of the pedestrian areas in and around the site, (as opposed to protection from extreme storm conditions which may arrive infrequently from non-prevailing wind directions.) Attachments 1 and 2, excerpted from our report, identify these critical wind areas. The areas which are impacted by the present massing of the Western International Hotel are Huntington Avenue and areas at the corners of Huntington and Dartmouth and Huntington and Stuart. These areas are presently affected by high winds diverted toward the site by several buildings of the Prudential Complex when winds are blowing from the northwest direction, and by the Prudential Tower and lowrise Prudential Center buildings when the winds are blowing from the southwest. The principal "routine" effects (i.e., high frequency of occurrence) of the Copley Place Project are to divert additional winds down the face of the Western International Hotel during northwest winds, and to create interaction between the Marriott Hotel and the Prudential Center buildings when winds blow from the southwest.

3. WIH Massing Approaches to the Mitigation of Wind in Critical Are

We reviewed the candidate alternatives to massing of the Western which could, in principle, be considered toward mitigation of Huntington Avenue winds. Several alternative massing schemes had previously been reviewed and rejected due to high wind impact. Our recent approach to reviewing the alternatives considers effects on all other areas as well as those along Huntington Avenue.

A. Northwest winds

As previously indicated, the northwest winds are diverted onto Huntington Avenue by the interaction of the Western International tower and podium with the lowrise structures on the north side of Huntington Avenue. Our analysis of available scientific data for controlled situations**shows that the spacing of the Western from

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* Pedestrian Wind Environment at Copley Place, Boston, MA. Final Report; BBN Report 4415, dated September, 1980

**Such as reported by the Building Research Establishment in England.

the opposing lowrise produces a street level wind which is lower than might be expected if the separation were larger (Attachment 3). Although the exact flow environment of the building and the attendant geometries are somewhat different than the situation from which this analysis has been derived, the observed phenomena and the relative effects are expected to be similar. The attachment 3 shows that moving the tower further away from the lowrise on the opposite side of the street would tend to increase the velocity at street level, or at the very least, not make a significant change. Alternatively, if the tower could actually be moved closer to its neighbors across Huntington Avenue, one might expect a reduction of this particular phenomena. A 10 to 20 foot setback has been suggested by BRA personnel as a remassing from which they believe wind reduction benefits would occur on the street level on Huntington Avenue. Attachment 4 shows what a 10 to 20 foot setback would look like in plan, and projection. We believe that any benefical effect of the "shelf" which would be created at the podium/tower intersection would be offset by the phenomena illustrated in Figure 3. We would further like to review the following resultant effects of such a setback:

> For northwest winds, such a setback would increase winds along Dartmouth Street, which would have impacts on Back-Bay Station, Copley Plaza Hotel, Hancock Garage, and the entrance to the Hotel Boston area at the corner of Stuart and Dartmouth Streets. Additionally, adverse effects could be expected to occur for generally easterly to southeasterly winds at both Dartmouth Street and as far away as the Boston Public Library.
>
> This setback would also move the tower closer to the John Hancock building. Our wind tunnel studies have indicated that the present massing, which has the WIH tower as far away from the Hancock as possible, does not adversely affect the facade pressure loads on the Hancock Tower. However, if the WIH tower were relocated, or made taller, this conclusion could not be generalized to the new location. The flow field impacting on the Hancock and other buildings in the area is sensitive to details in the arrangement of the buildings.
>
> For southwest winds (which are about as prevalent as northwest winds in Boston) a small setback of the Western International Hotel would not significantly help winds on Stuart Street, or on Huntington Avenue and, as already mentioned, could adversely affect the pressure loads on the Hancock Tower and Copley Plaza.

Another solution which has been suggested is the creation of a "slot" at the elevation of the intersection at the Western International Hotel Tower with its podium, similar to that found in the Federal Reserve Bank of Boston. The suggestion is that that slot would relieve airflow beneath the Western Tower before it reaches street level. We have sufficient data on the WIH to indicate that the slot, even in a totally open form (i.e., no core blockage) could not provide significant relief. The local excess pressure required to drive air through the slot is virtually nil at podium height because the winds are flowing tangentially, (i.e., down the building). Pressure distribution data obtained in connection with tower loading studies on the tower provide the source of this conclusion (see WIH loads reports). Some air would be drawn through the slot as a result of the suction on the downwind side of the tower; however, the requirement for a large central core of the building would block most of the airflow and mitigate any significant benefit of the slot. There is not data known to us in the literature which conclusively indicates that such "slots" work in the type of environment which is experienced by the Western International Hotel. The combination of a totally open slot and a large setback or podium extension would be required to generate sufficient pressure rise on the upwind side to force air through the slot, as suggested.However, a slight setback and slot might actually move the stagnation point*on the tower in a manner such that the amount of air flowing through the slot would be offset by an increased volume of air coming down the face of the building. Further, if the creation of the slot resulted in an attendant increase in the building height, then an overall increase in winds in the area would be expected, further offsetting any advantages of the slot.

4. Summary of the Relative Advantages of the Present WIH Massing

In spite of the forgoing discussion which focuses on residual wind problems on Huntington Avenue caused by the Western Tower, a number of favorable wind reduction features are incorporated into the present massing of the Western. These are enumerated below:

- The narrow face of the building is pointing into the prevailing southwest winds, thus minimizing the building's affect on ground level winds,for winds from the southwest.

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* That point which divides the wind flowing over the tower from that flowing down the face.

- The tower is located as far from the John Hancock as possible therefore minimizing the possibility of adverse impact of the tower wake on the Hancock facade.

- The Western incorporates large chamfers on corners facing the north and southeast, which is known to be a favorable wind reduction technique.

- The tower location with respect to the podium reduces the effect on winds along Dartmouth Street and the intersection of Dartmouth and Stuart, the front of the Copley Plaza, and the intersections of Huntington and Dartmouth. Moving the tower away from its present location would tend to increase winds in these areas.

5. Alternatives to Remassing

An alternative solution to the tower setback would be the addition of a "shelf" or large canopy along Huntington Avenue, which would affect the downflow on the northerly face of the tower in the same manner as a setback, but could be located immediately above the sidewalk. Such a canopy would avoid the adverse effects along Dartmouth Street on the John Hancock Tower, and at other aforementioned sites which would most likely accompany a relocation of the tower.

As we have indicated on many occasions, we believe that the remaining unacceptable wind problems can and must be dealt with at this stage by creation of a low wind pedestrian track through and around the site which is accomplished by local architectural features. We thus reiterate that, based upon the extensive studies which we have conducted to date, it is our professional judgment that a minor relocation of the Western Tower would not result in any significant *net* benefit to the pedestrian wind environment, and that a *major* relocation of the tower could adversely affect several sensitive areas around the site.

We would in closing note that a significant relocation of the tower would require virtually a full repetition of all wind tunnel studies accomplished to date--namely documentation of pedestrian level winds, tower and facade loads, pressures on the John Hancock Tower, and pollution dispersion from the turnpike ventilation system.

We remain available to the BRA, UIDC, and TAC to discuss again our findings, our extensive wind tunnel data base, and develop meaningful solutions to wind impacts.

Sincerely,

BOLT BERANEK AND NEWMAN INC.

Richard E Hayden

Richard E. Hayden, Manager
Aero Sciences Department

REH/sl
Attachments

cc: S. Eimer, UIDC

Attachment 1. Location of Test Sensors for Pedestrian Level Wind Study - Reprinted

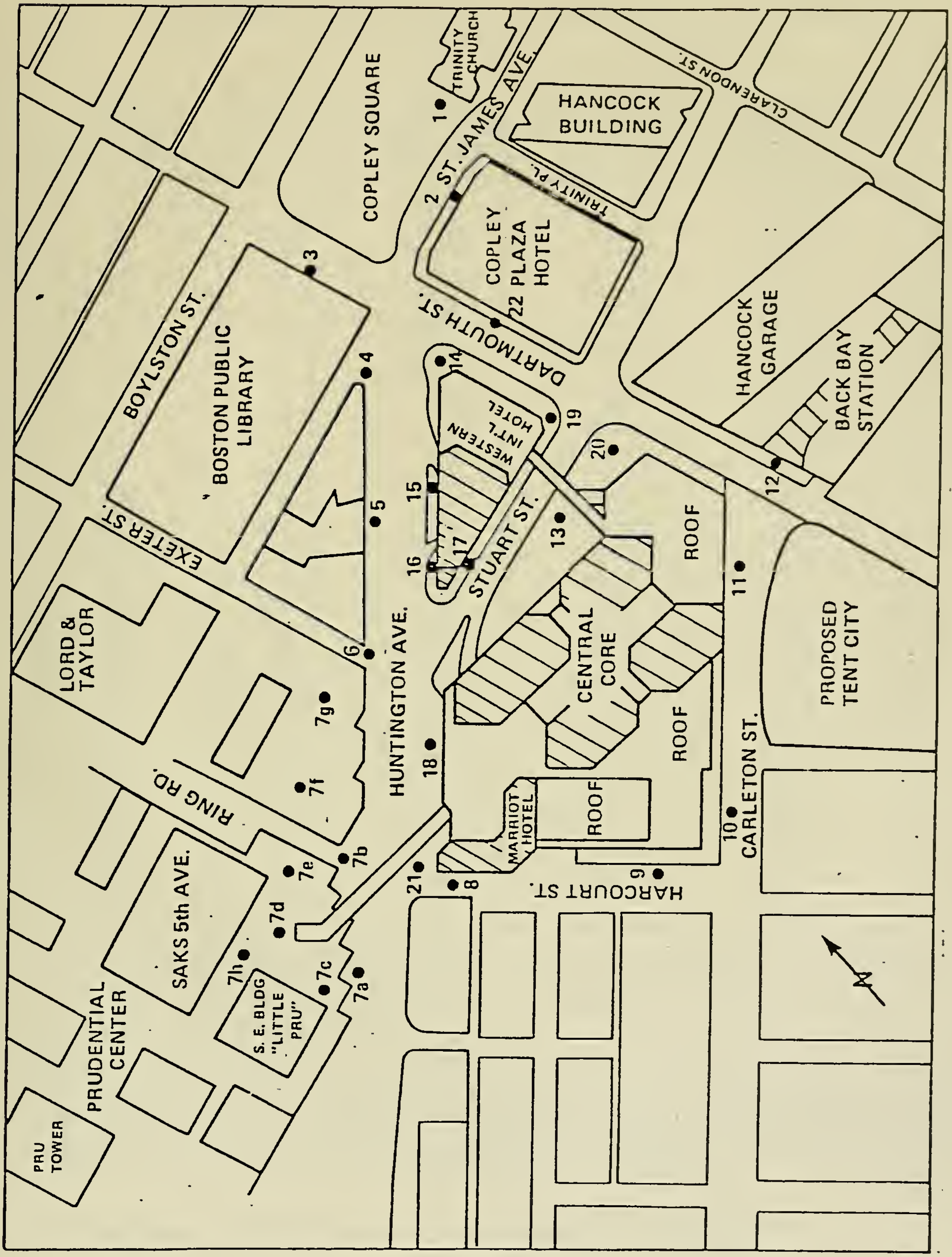


FIG. 1. COPLEY PLACE PROJECT IN RELATION TO OTHER LANDMARKS IN THE PRUDENTIAL CENTER/ COPLEY PLACE AREA (NUMBERS REFER TO PEDESTRIAN-LEVEL WIND SENSOR LOCATIONS).

TABLE 1. COMPARISON OF ANNUAL MEAN AND EFFECTIVE WIND GUST SPEEDS.*

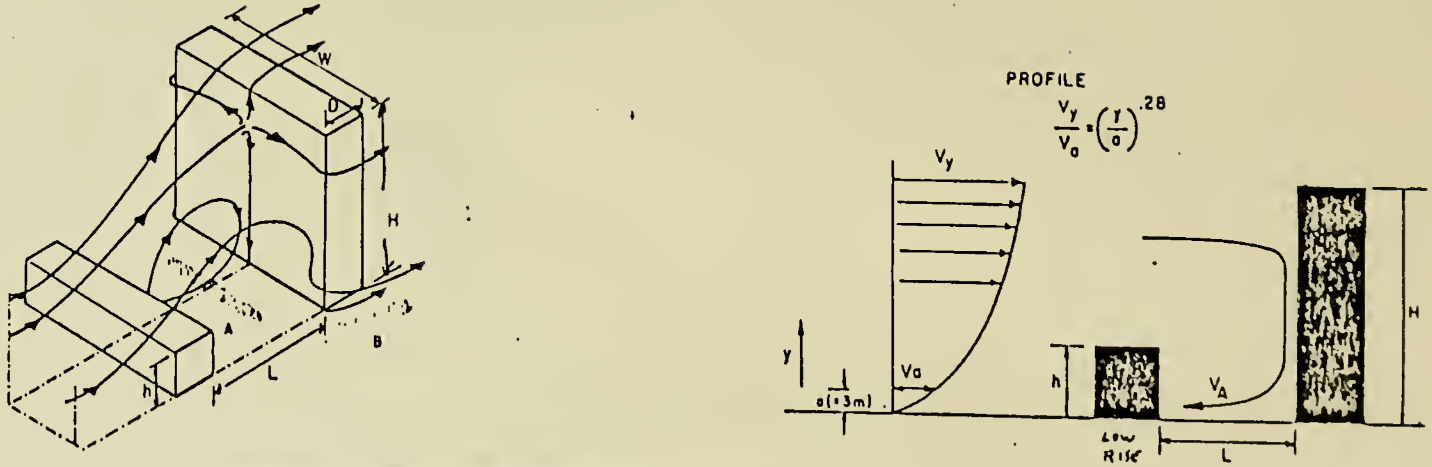
Sensor Location (See Fig. 1)	Mean Velocity (mps)		Effective Gust Velocity (mps)	
	Existing	Proposed	Existing	Proposed
1	10.9	10.4	14.9†	14.8†
2	11.6	11.2	15.0†	14.6†
3	5.2	5.7	7.9	8.5
4	7.5	8.5	10.2	11.0
5	4.8	7.3	9.1	12.0
6	11.8	11.3	14.7†	15.1†
7a	12.0	11.7	15.4†	13.7†
7b	8.5	12.7	12.3	15.8†
7c	6.6	7.7	9.9	11.3
7d	9.1	9.3	12.5	12.9
7e	10.4	9.3	14.7†	13.7†
7f	10.5	9.8	14.4†	13.7†
7g	6.9	9.0	10.1	12.4
7h	11.3	11.4	14.0†	14.0†
8	9.6	6.9	13.1	9.8
9	4.4	7.5	6.6	10.4
10	7.2	8.3	10.4	11.4
11	6.7	9.9	9.6	12.8
12	5.6	6.0	8.5	9.4
13	8.5	9.2	11.0	12.8
14	9.9	9.3	12.5	12.4
15	--	8.7	--	11.7
16	--	8.7	--	11.5
17	7.9	9.9	11.6	12.7
18	--	7.5	--	12.0
19	9.8	10.0	13.3	13.4
20	--	5.9	--	9.0
21	11.9	11.7	14.8†	14.9†
22	9.0	8.1	11.9	11.0

*For mean wind speed, the value given will be exceeded 1% of the time. For the effective gust wind speed, the probability that the velocity of a sustained gust (approximately 40 sec long) will exceed the value given is 0.01, i.e., 1%.

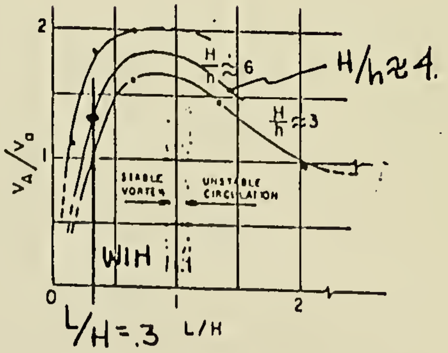
†These values exceed the wind speed of 13.6 mps (30.5 mph); this speed has been suggested as a threshold of acceptability above which winds may pose hazards for frail or handicapped people. However, because human perception of wind effects is a subjective phenomenon, a generally applicable numerical value of an acceptability threshold is unobtainable.

Attachment 2. Table of Predicted Windspeeds - Reprinted

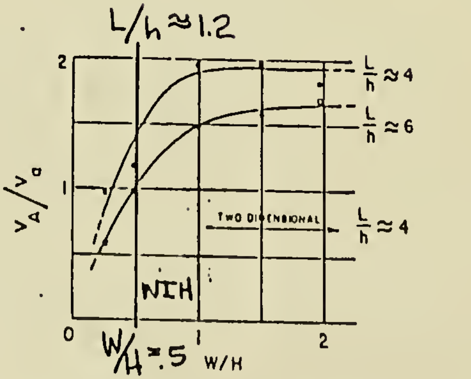
Attachment 3. Schematic of Controlled Case - Reprinted



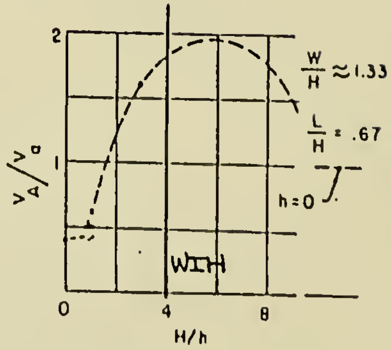
SCHEMATIC FLOW PATTERN AND DEFINITION OF TERMS



EFFECT OF SPACING (LH) ON PEDESTRIAN WIND BETWEEN BUILDINGS



EFFECT OF FACE WIDTH ON PEDESTRIAN WINDS BETWEEN BUILDINGS

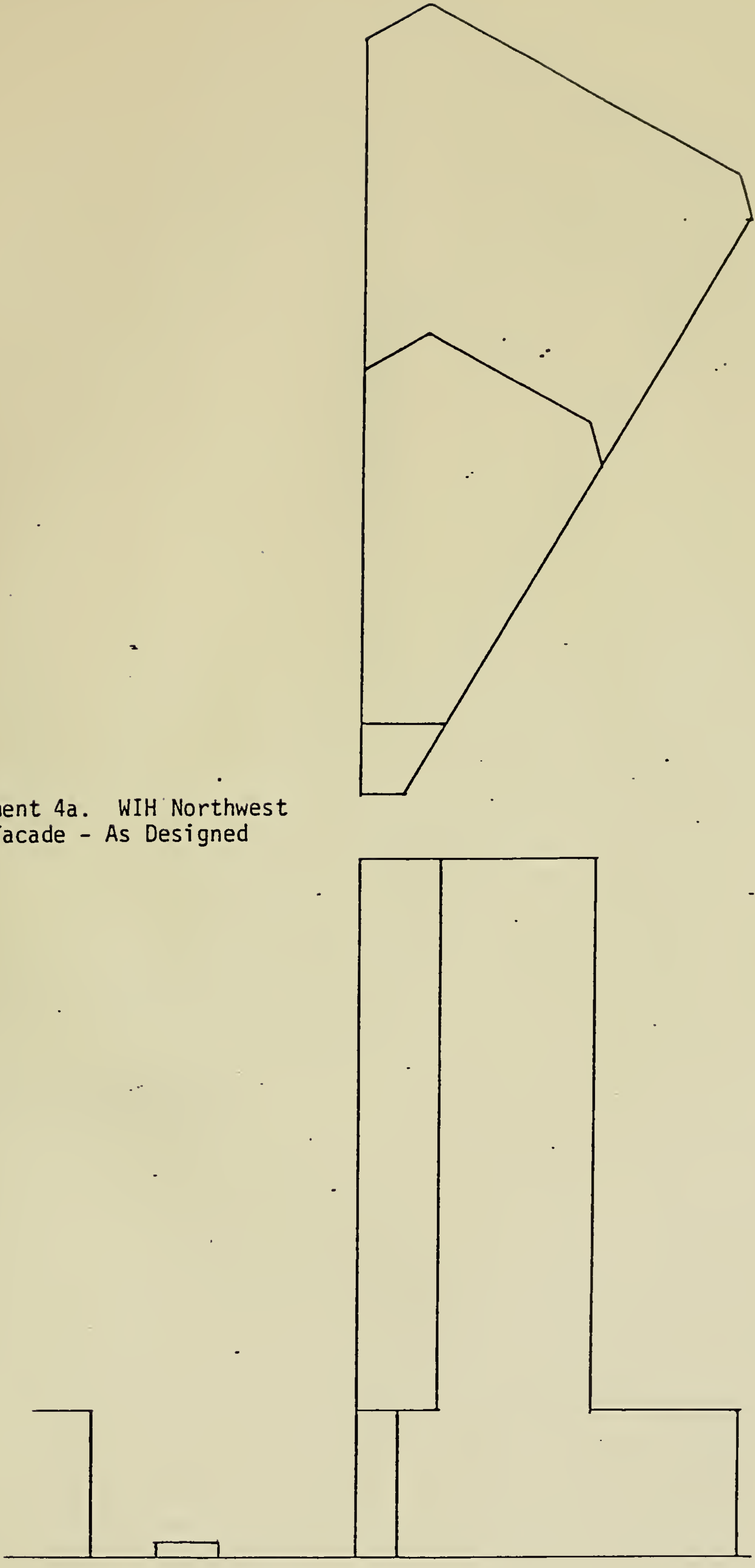


EFFECTS OF RELATIVE HEIGHTS ON ON PEDESTRIAN WIND SPEED BETWEEN BUILDINGS

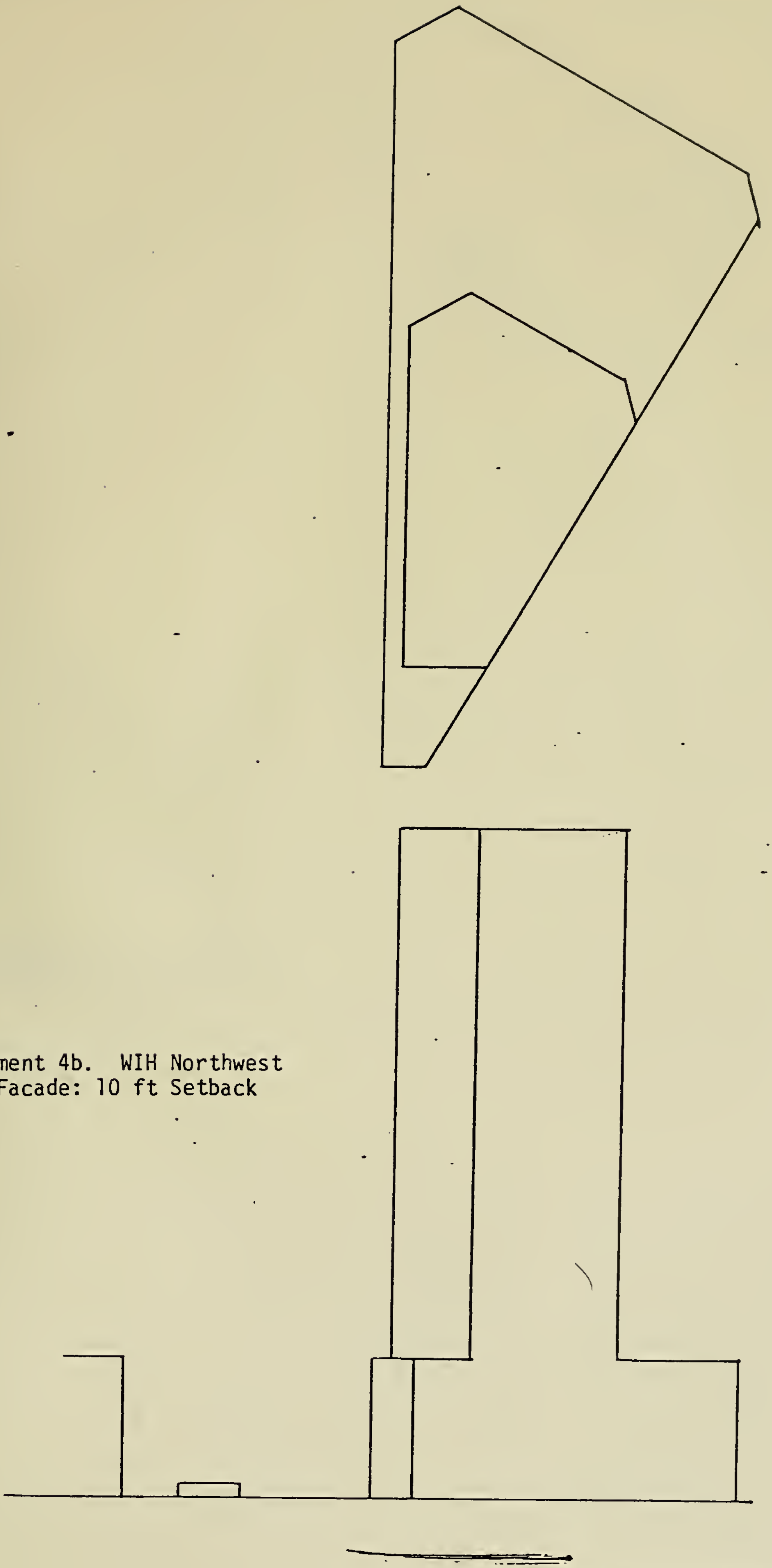
Note; Present relationship is favorable, increasing L would increase local wind speeds.

Note: For W/H less than 1, (0.5 for WIH), there is a favorable wind impact.

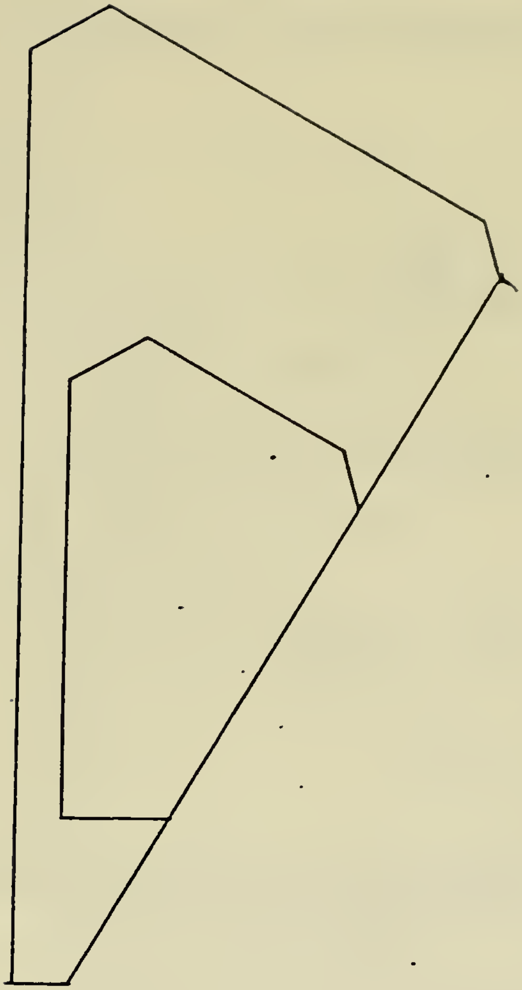
Note: This curve is for a relationship different from the WIH. It demonstrat a trend only.

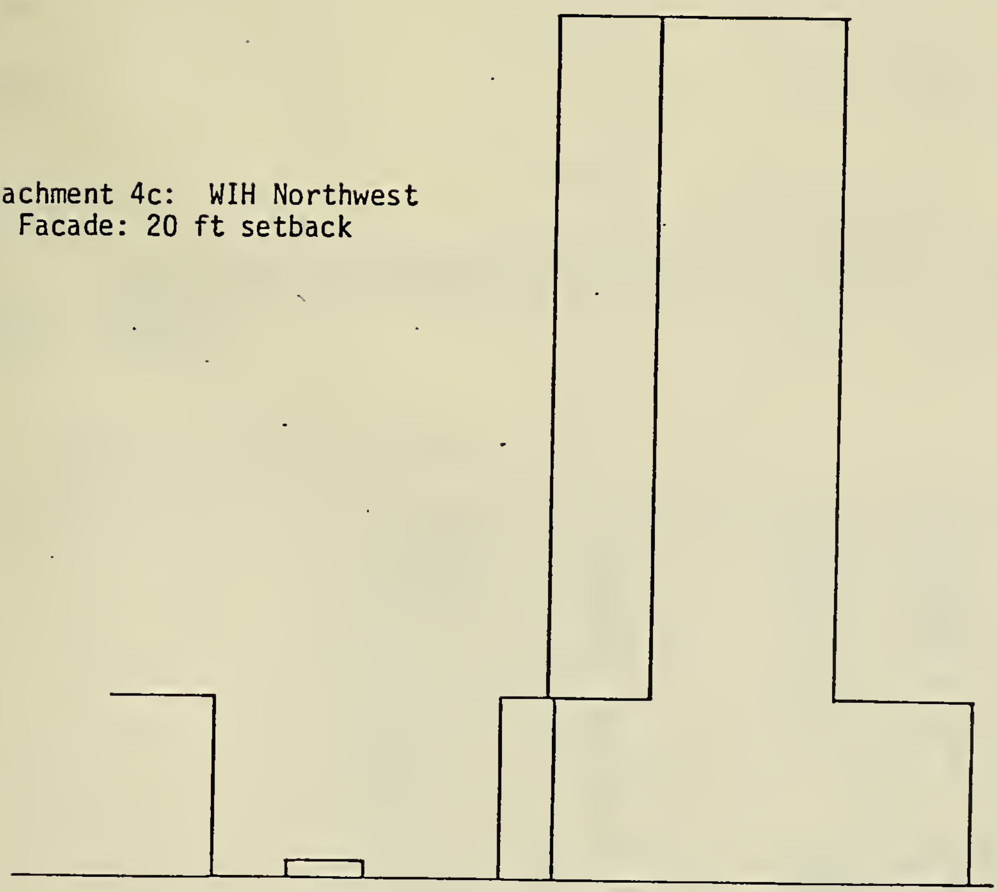


Attachment 4a. WIH Northwest Facade - As Designed

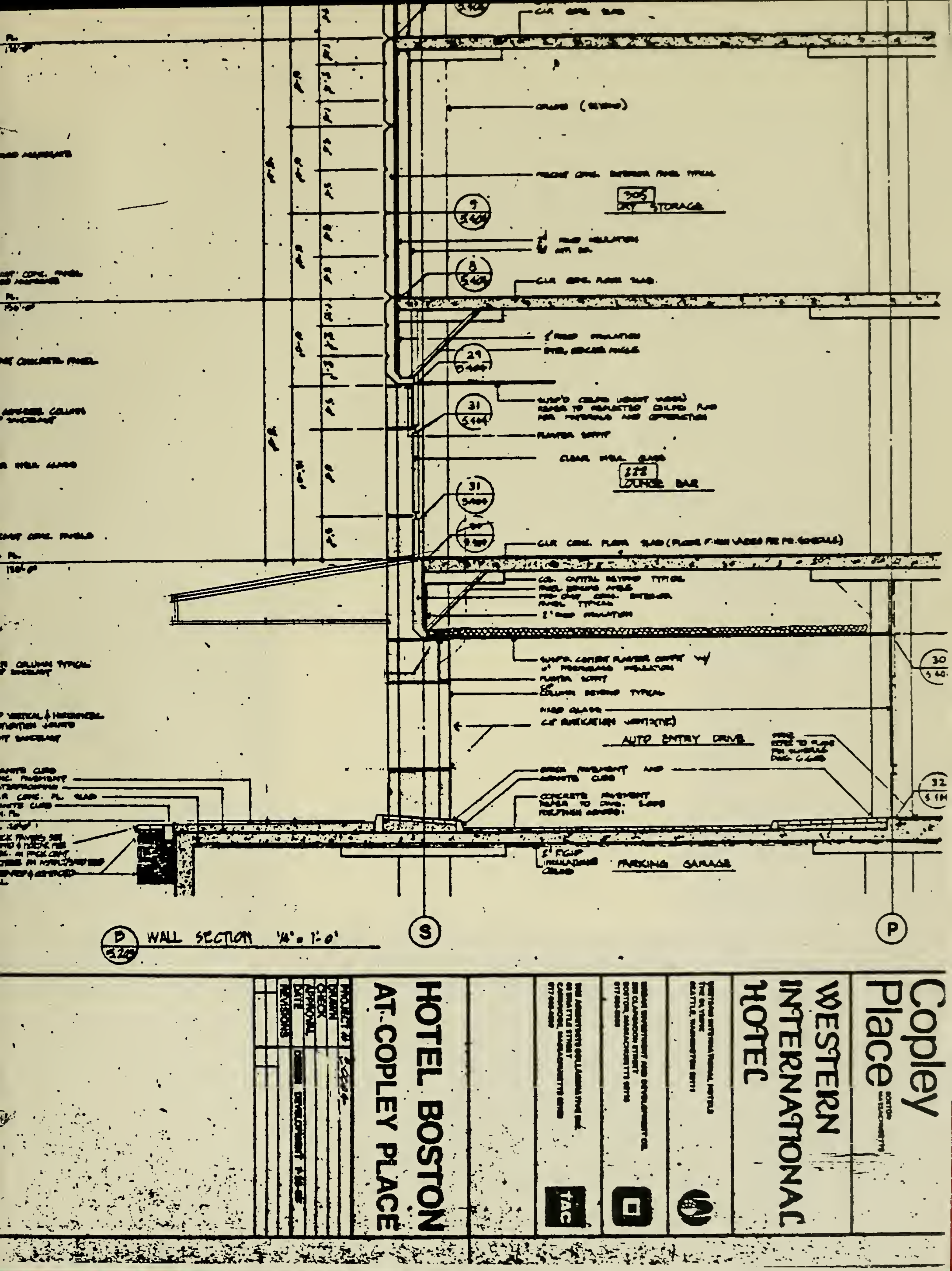


Attachment 4b. WIH Northwest
Facade: 10 ft Setback





Attachment 4c: WIH Northwest
Facade: 20 ft setback


305
DRY STORAGE
9
8
29
31
31
258
LOUNGE BAR
CLEAR WELL GLASS
PLASTER SOFFIT
AUTO ENTRY DRIVE
PARKING GARAGE
CONCRETE PAVEMENT
30
32
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D
WALL SECTION 1/4" = 1'-0"
Copley Place
WESTERN INTERNATIONAL HOTEL
TAC
HOTEL BOSTON AT COPLEY PLACE
PROJECT #
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